Catalogue of American Amphibians and Reptiles.

Ballinger, R.E., J.A. Lemos-Espinal, and G.R. Smith. 2000. *Xenosaurus grandis*.

Xenosaurus grandis (Gray)
Knob-scaled Lizard

Cubina grandis Gray 1856:270. Type locality, "Mexico, near Cordova [Veracruz]." Syntypes, British Museum (Natural History) (BMNH) 1946.8.30.21–23, adults of undetermined sex, purchased by M. Sallé, accessioned 17 April 1856, collector and date of collection unknown (not examined by authors).

Xenosaurus fasciatus Peters 1861:453. Type locality, "Huanusco, in Mexico" (emended to Huatusco, Veracruz, by Smith and Taylor 1950a,b). Holotype, Zoologisches Museum, Museum für Naturkunde der Humboldt-Universität zu Berlin (ZMB) 3922, a subadult of undetermined sex, collected by L. Hille, date of collection unknown (Good et al. 1993) (not examined by authors).

Xenosaurus grandis: Cope 1866:322. First use of present combination.

• **CONTENT.** Five subspecies are currently recognized: *grandis, agrenon, arboreus, rackhami*, and *sanmartinensis* (see **Comments**).

• **DEFINITION AND DIAGNOSIS.** *Xenosaurus grandis* is a medium sized lizard (to 120 mm SVL) with a canthus temporalis forming a longitudinal row of enlarged scales distinct from smaller rugose temporal scales, a longitudinal row of 3–5 enlarged hexagonal supraoculars, one or more paravertebral rows of enlarged tubercles, a dorsal pattern of dark brown- or black-edged white crossbands on a brown ground color, a v-shaped nape blotch, venter usually with distinct dark spots or bars, and red eyes.

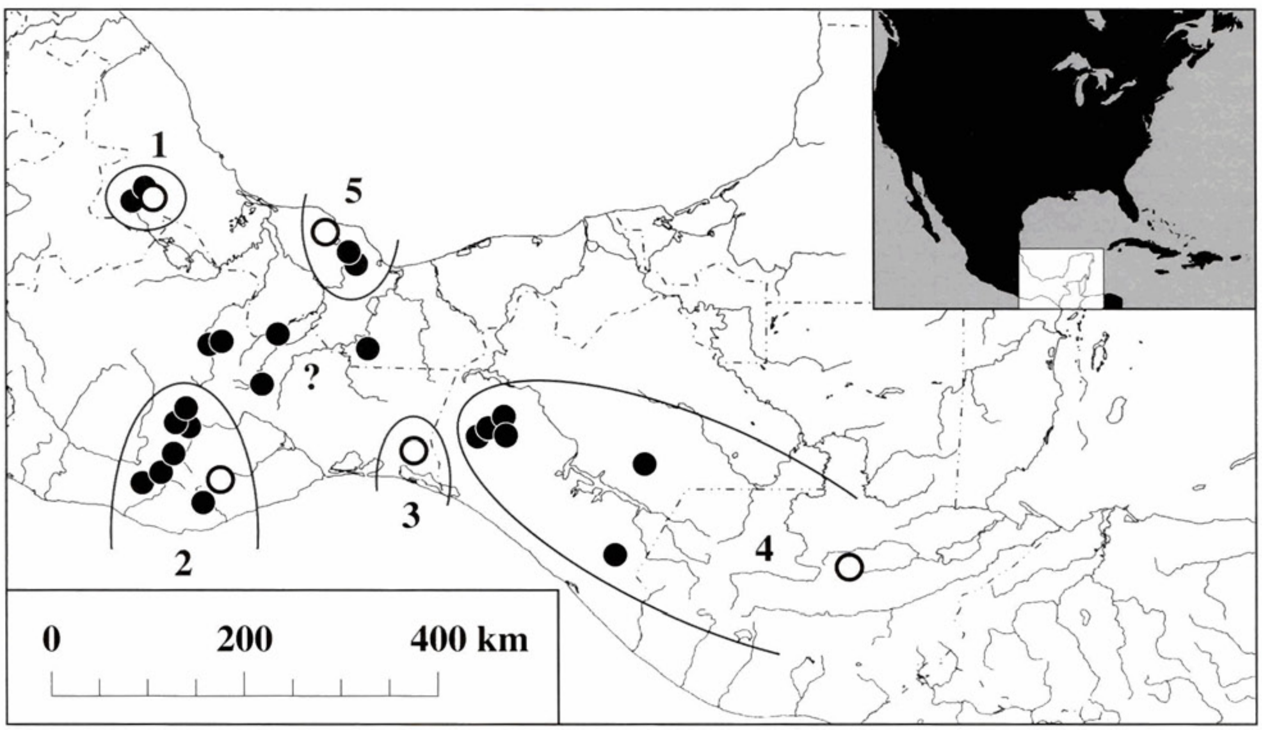




FIGURE. Adult *Xenosaurus grandis* from 1 km SE Cordoba, Veracruz, México; note the red iris characteristic of this species.

• **DESCRIPTIONS.** The review by King and Thompson (1968) provided the only detailed descriptions beyond the originals.

• **ILLUSTRATIONS.** Alvarez del Toro (1982), Obst et al. (1988), Villa et al. (1988), and Köhler (2000) included color photographs. Black and white photographs are in Lynch and Smith (1965, of *X.*



MAP. Distribution of *Xenosaurus grandis*; circles indicate type localities, dots mark other records, the question mark indicates possible intergrades, but a review of subspecies is needed (see **Comments**). Range outlines are not indicated because populations are disjunct.

g. arboreus), Alvarez del Toro (1960, of *X. g. rackhami*), Holman (1973, of *X. g. grandis*), Werler and Shannon (1961, of *X. g. sanmartinensis* and the type locality), and Weigel and Holman (1967, of *X. g. grandis*). Line drawings with examples of pattern variation are in Terentyev (1965) and King and Thompson (1968). Harvey (1993) included six SEM photos of scales. Drawings and photographs of the skeleton or external features are in Duméril et al. (1878), Cope (1892), Fürbringer (1922), Camp (1923), Barrows and Smith (1947), McDowell and Bogert (1954), Hecht and Costelli (1969), Mertens (1971), Wever (1973, 1978), Rieppel (1979, 1980), Gauthier (1982), Edmund (1960), Böhme (1988), and Estes et al. (1988). Line drawings of muscles are in Camp (1923), Haas (1960), and Rieppel (1980).

• **DISTRIBUTION.** The species is distributed as disjunct populations from west central Veracruz southward in the Mexican states of Guerrero, Oaxaca, and Chiapas to Alta Verapaz, Guatemala.

• **FOSSIL RECORD.** None.

• **PERTINENT LITERATURE.** References are listed by topic (also see **Comments**): **anatomy, including the skeleton** (Cope 1892, Camp 1923, Furbinger 1922, Smith and Laufe 1945, Barrows and Smith 1947, McDowell and Bogert 1954, Etheridge 1967, Hecht and Costelli 1969, Wu and Huang 1986), **scleral ossicles** (Estes 1983), **microanatomy of scales** (Harvey 1993), **musculature** (Haas 1960, Rieppel 1980, Arnold 1984b, Böhme 1988, Arnold 1994), **nerves** (Jullien and Renous-Lecuru 1972, Cruce and Newman 1984), **brain** (Northcutt 1978), **teeth** (Edmund 1960, on replacement), **thyroid** (Lynn and Walsh 1957), **tongue** (Schwenk 1985, 1988), **parietal eye** (Gundy and Wurst 1976), and **ear** (Miller 1966, Mertens 1971).

King and Thompson (1968) provided the only **taxonomic review**. Additional phylogenetic studies include Good (1987) and Estes et al (1988). Comments on **biogeography** include Stuart (1950), Savage (1966), and Johnson (1989).

Additional topics include: **behavior** (Holman 1966, Arnold 1984a, Mitchell 1986, Greene 1988, Ballinger et al. 1995, Gove 1979, Ballinger et al. 1992), **development** (Perrier 1928), **food** (Presch 1981, Ballinger et al. 1995), **genetics** (Good 1987, Macey et al. 1997), **longevity** (Snider and Bowler 1992), **natural history** (Taylor 1949, Werler and Shannon 1961, Stuart 1948, King and Thompson 1968, Ballinger et al. 1995), **reproduction** (Fritts 1966; Greene 1970; Olney 1979, in captivity; Ballinger et al., in press; Smith et al., in press, male reproduction), and **sexual dimorphism** (Smith et al. 1997).

The species is mentioned in a variety of **notes and faunal lists**: Duméril et al. (1878), Garman (1884), Cope (1900), Stuart (1941, 1942, 1948), Smith (1949), Smith and Taylor (1950a,b), Shannon (1951), McCoy and Van Horn (1962), Stuart (1963), Baker et al. (1971), Campbell (1984), Lara-Gongora (1986), Pregill et al. (1986), Flores-Villela et al. (1987), Perez-Higareda et al. (1987), Villa et al. (1988), Wake and Johnson (1989), Campbell and Vannini (1989), Perez Ramos and de la Riva (1989), Flores-Villela (1993), Liner (1994), Munoz et al. (1996), and Köhler (2000).

• **ETYMOLOGY.** The name *grandis* apparently refers to this species' "large, splendid, or stately" appearance; *agrenon* (Greek, "net") to the dorsal pattern in this form; *arboreus* to the tree-dwelling habits of this subspecies; *rackhami* is a patronym honoring H.H. Rackham, who provided the UMMZ with an endowment that funded the trip during which the holotype was collected; and the name *sanmartinensis* refers to the type locality.

• **COMMENTS.** Much of the early literature treats this species as representative of the genus and family, and may include references to forms now considered to be specifically distinct.

This species' distribution, although broad, is disjunct and restricted to specific microhabitats that include rock crevices. Disjunct distributions promote development of variation and subspeciation. New populations (even new taxa, see Ballinger et al. 2000) will likely be found with more extensive field work. Even now, a careful taxonomic review is needed to affirm subspecific identities in light of distributional records recorded subsequent to the study of King and Thompson (1968).

Although these lizards once were thought to be rare, the authors have found them both locally abundant and absent in seemingly favorable areas.

1. *Xenosaurus grandis grandis* (Gray)
Mexican Knob-scaled Lizard

Xenosaurus grandis: Cope 1866:322. See species synonymy.
Xenosaurus grandis grandis: Lynch and Smith 1965:170. First use of trinomial.

• **DEFINITION.** The head of this form is broadly triangular (0.79–0.96 times as wide as long) and the tail is about equal (0.86–1.10 times) to SVL. A pattern of lateral tubercles is obscured by small folds and creases in the skin that radiate from the lateral fold. Chest scales are arranged in a random or reticulating series. The venter is light with dark spots that may form distinct ventrolateral bars.

2. *Xenosaurus grandis agrenon* King and Thompson
Mountain Knob-scaled Lizard

Xenosaurus grandis agrenon King and Thompson 1968:108. Type locality, "Rio Sal, Lachas, Juguila, Oaxaca, [Mexico]." Holotype, University of Illinois Museum of Natural History (UIMNH) 69375, an adult female, collected by T. MacDougall during March-May 1966 (not examined by authors).

• **DEFINITION.** The head of this form is broadly triangular as in *X. g. grandis* and the tail is shorter than (0.79–0.97 times) the body. The dorsal groundcolor is very dark with transverse light bands reduced even to paravertebral light spots. The dark nape band is obscured by the general dark coloration, but is v-shaped and pointed posteriorly. The venter is uniform light gray.

3. *Xenosaurus grandis arboreus* Lynch and Smith
Arboreal Knob-scaled Lizard

Xenosaurus arboreus Lynch and Smith 1965:163. Type locality, "La Cumbre de la Sierra Madre above Zanatepec, Oaxaca, [Mexico] about 4500 feet (1364 m) elevation." Holotype, University of Illinois Museum of Natural History (UIMNH) 56576, age and sex unknown, collected by T. MacDougall in February 1964 (not examined by authors).
Xenosaurus grandis arboreus: King and Thompson 1968:106. First use of trinomial.

• **DEFINITION.** The head of this form is broadly triangular as in *X. g. grandis* and the tail is shorter than the body as in *X. g. agrenon*. The dorsal groundcolor is medium to dark brown, usually with transverse light bands that may be reduced to rows of spots. The dark nape band is w-shaped and rounded posteriorly. The venter usually has dark bars.

4. *Xenosaurus grandis rackhami* Stuart
Rackham's Knob-scaled Lizard

Xenosaurus rackhami Stuart 1941:47. Type locality, "Finca Volcan (49 kilometers due east of Coban), Alta Verapaz, Guate-

mala, at an altitude of about 4000 feet (1212 m)." Holotype, University of Michigan Museum of Zoology (UMMZ) 89072, an adult male, collected by L.C. Stuart, 27 March 1940 (not examined by authors).

Xenosaurus r[ackhami]. rackhami: Werler and Shannon 1961:128.

Xenosaurus grandis rackhami: Lynch and Smith 1965:171. First use of present combination.

• **DEFINITION.** The head of this form is narrowly triangular (0.73–0.83 times as wide as long) and the tail is 0.87–1.09 times SVL. The transverse light bands on the body are no lighter than the ground color and dark markings are reduced to spots or blotches. A dark v-shaped nape band or blotch is present. The chest scales tend to be arranged in transverse rows and lateral tubercles are not arranged in any clear pattern. The venter is cream to white with adjacent brown or black crossbars that are fewer in number than the dorsal series of dark blotches.

5. *Xenosaurus grandis sanmartinensis* Werler and Shannon San Martin Knob-scaled Lizard

Xenosaurus rackhami sanmartinensis Werler and Shannon 1961: 128. Type locality, "...the crater of Volcan San Martin, Veracruz, Mexico, elevation 5,000 feet (1515 m)." Holotype, University of Illinois Museum of Natural History (UIMNH) 80687 (formerly 10540 in the private collection of Frederick A. Shannon), an adult female, collected by J.R. Reid and J.E. Werler on 25 January 1954 (not examined by authors).

Xenosaurus grandis sanmartinensis: Lynch and Smith 1965:171. First use of present combination.

• **DEFINITION.** The head of this form is narrowly triangular as in *X. g. rackhami*, and the tail is 0.88–1.03 times SVL. The transverse light bands on the body are always lighter than the ground color, and the dark bands are irregular but continuous across the dorsum. The venter has dark crossbands on a light background. The chest scales tend to be arranged in transverse rows and the dark nape band or blotch is v-shaped and attenuate posteriorly.

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ROYCE E. BALLINGER, School of Biological Sciences, University of Nebraska, Lincoln, NE 68588 (rballinger1@unl.edu), **JULIO A. LEMOS-ESPINAL**, Laboratorio de Conservación, CYMA, UIICSE, Escuela Nacional de Estudios Profesionales Iztacala, Estado de México, México (lemos@servidor.unam.mx), and **GEOFFREY R. SMITH**, Department of Biology, Denison University, Granville, OH 43023 (smithg@denison.edu).

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